Dental Caries Experience and Salivary Elements Among A Group of Young Adults In Relation to Age and Gender

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ABSTRACT

Background: Dental caries is a most common social and intractable infectious disease in human. Saliva is critical for preserving and maintaining oral health and salivary elements had many effects on caries experience.
Aim of study: This study was conducted to assess dental caries severity by age and gender and their relation to salivary zinc and copper among a group of adults aged (19-22) years.
Materials and methods: After examination eighty persons aged 19-22 years of both gender. Caries severity was documented according to DMFS index. Stimulated salivary samples were collected and chemically analyzed under standardized condition to detect salivary elements zinc and copper. Concentrations of Zinc and copper were measured by using atomic absorption spectrophotometry.
Results: The finding revealed that the total males had higher mean value of DMFS and DS fraction than that of the total females with statistically non-significant differences at p> 0.05 regarding of DMFS, while significant difference was found regarding DS fraction. Frist age group (19-20) had a lower mean value of DMFS than that of the second age group (21-22), while it had a higher mean value of DS fraction with statistically non-significant differences. There were statistically non-significant differences at p> 0.05 between males and females regarding salivary zinc and copper concentrations.Non-significant positive weak correlation between DMFS index and salivary zinc and copper.
Conclusion: Saliva is the one of important factors in prevention of dental caries. Therefore, chemical changes in salivary composition play an important role in development and progression of caries.
Key words: dental caries, zinc, copper, young adults person. **(J Bagh Coll Dentistry 2017; 29(1):188-192)**

INTRODUCTION

Dental caries is the most common chronic disease among oral disease. All people are affecting by dental caries irrespective of their socioeconomic classes, gender, race and age. It is also greatly affected by additional factors such as saliva and oral hygiene [1,2]. Zinc is present in saliva and it is ubiquitous in the body [3] and the teeth [4].

Zinc (Zn) was considered to be doubtful element that inhibits caries development [5]. Zinc, an anti-inflammatory agent and intracellular signaling molecule, is instrumental in immune response and serves important functions in the body with its antioxidant properties. Its dynamic for stimulating growth, neurological and physical development in infants, children and teenagers [6]. Copper ion (Cu) has been recorded to have many effects on general health and in addition to antibacterial effect of copper both in vitro [7] and in vivo [8].

There are many studies showed that there are non- significant differences between the level of salivary copper and high significant variation in concentration of salivary zinc among children with caries experience and caries free children regardless to age and gender [9, 10, 11]. For all the above, this study was conducted among a group of adults to assess zinc and copper ions in relation to caries experience.

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MATERIALS AND METHODS

Eighty subjects (30 males and 50 females) were randomly selected in this study (cross sectional study), they were between the age of 19-22 years of both gender. This study was carried out during the period between 21 December 2014 and 3 March 2015 in Baghdad. Collection of samples was at AL-Jameaa Heath Center and at Collage of dentistry/ Baghdad University, All laboratory works were done in poisoning consultation center, Gazi Al-Hariry hospital. Collection of saliva is done at morning 10-12 a.m. Collection of stimulated salivary samples was performed under standard condition following the instructions cited by Tenovuo and Lagerlof [12].

Each subject gets a tube and asked to collect 5 ml saliva in the tube by spitting. After collection of saliva, samples were centrifuged at 3000 rpm for 5 minutes, the clear supernatant were separated and stored frozen at- 20 c in plastic polyethylene tubes until time of biochemical analysis. Caries-experience was diagnosed and recorded according to Decayed, Missing and Filled (DMFS) Index following the criteria described by WHO [13]. The examination starts from the upper right second molar from one tooth or space to adjacent tooth or tooth space reach upper left second molar then to lower left ending with the lower right second molar. Biochemical analysis for essential elements zinc and copper

(µg/dl) was achieved by using Buck scientific atomic absorption spectrophotometer.

RESULTS

Although total males had higher mean value of DMFS than that of the total females (9.36±1.10, 8.08±1.47 respectively), but statistically non-significant differences at p > 0.05 was found between them. Total first age group (19-20) had a lower mean value of DMFS than that of the total second age group (21-22) with statistically non-significant difference between two age groups (df=78, t-test=0.96, p=0.34) for total two age group (Table 1).

Table (2) demonstrates the mean values and standard errors of DS fraction of DMFS index in males and females for both age groups. Total males showed higher mean values of DS than that of the total females (5.17±0.85, 3.58 ±0.72 respectively) with statistically significant differences at p < 0.05.Table (3) shows the mean values and standard errors of salivary zinc concentration measured (µg/dl) in males and females for both age groups.

Total males demonstrated the same mean value of salivary zinc concentration as in total females (3.47±0.20, 3.39±0.14 respectively) with statistically non-significant differences at p > 0.05.The first age group (19-20) had the same mean value of salivary zinc concentration with the second age group (21-22) with statistically non - significant difference (df=78, t-test=1.84, p=0.06). Also there were no significant differences in between males and females in the sub age groups regarding salivary zinc concentration at p > 0.05.

Total males reported the same mean value of salivary copper concentration as in the total females (5.24±0.10, 5.39±0.13 respectively) with statistically non-significant differences at p > 0.05. Statistically, non-significant difference was found between two age groups regarding salivary copper concentration (df=78, t-test=0.25, p=0.80) (Table 4).

A non-significant positive weak correlations were found between dental caries and salivary zinc and copper (r=0.193, p=0.086; r=0.085 p=0.451 respectively)

Table 1: Caries experience DMFS by age and gender

Age	Gender	No.	Mean	±SE	df	t-test	p-value
19-20	Male	12	6.83	1.46	27	0.17	0.87
	Female	17	7.58	3.51			
	Total	29	7.27	2.12			
21-22	Male	18	11.05	1.45	49	1.27	0.21
	Female	33	8.33	1.36			
	Total	51	9.29	1.03			
Total	Male	30	9.36	1.10	78	0.62	0.54
	Female	50	8.08	1.47			
	total	80	8.56	1.02			

Table 2: Caries experience DS component of DMFS by age and gender

Age	Gender	No.	Mean	±SE	df	t-test	p-value
19-20	Male	12	5.17	1.29	27	0.42	0.68
	Female	17	4.06	1.99			
	Total	29	4.52	1.27			
21-22	Male	18	5.17	1.16	49	2.34*	0.02
	Female	33	2.82	0.38			
	Total	51	3.5	0.52			
Total	Male	30	5.17	0.85	78	2.04*	0.04
	Female	50	3.58	0.72			
	Total	80	4.55	0.57			

*Significant

Table 3: Salivary zinc concentration (µg/dl) by age and gender

Age	Gender	No.	*Mean	±SE		df	t-test	p-value
19-20	Male	12	4.01	0.38		27	1.18	0.25
	Female	17	3.50	0.23				
	Total	29	3.71	0.21				
21-22	Male	18	3.12	0.20		49	0.75	0.45
	Female	33	3.34	0.18				
	Total	51	3.25	0.13				
Total	Male	30	3.47	0.20		78	0.32	0.74
	Female	50	3.39	0.14				
	Total	80	3.42	0.11				

Table 4: Salivary copper concentration (µg/dl) by age and gender

Age	Gender	No.	*Mean	±SE	df	t-test	p-value
19-20	Male	12	5.33	0.17	27	0.22	0.83
	Female	17	5.38	0.11			
	Total	29	5.35	0.09			
21-22	Male	18	5.18	0.14	49	0.98	0.33
	Female	33	5.39	0.13			
	Total	51	5.31	0.10			
Total	Male	30	5.24	0.10	78	0.95	0.34
	Female	50	5.38	0.09			
	Total	80	5.33	0.07			

DISCUSSION

In the present study, eighty young adult persons aged 19-22 years were randomly selected (males 30 and females 50). Dental caries begins with microbiological shifts and is influenced by salivary composition and flow rate, dietary sugars consumption, fluoride exposure and preventive measurements [1]. Total males had a slightly higher mean values of DMFS and DS than that of the total females, this could be attributed to negligible oral cleanliness by males so that the level of oral hygiene worse than females this result in agreement with another study [14, 15]. The result of this study is in disagreement with Ahmadi-Motamayel study [16] which may be attributed to the earlier eruption of teeth among females, which causes longer exposure to cariogenic environment in the mouth [17].

Although the DMFS in this current study was higher among total second age group (21-22) years, it was reported that DS was higher among total first age group (19-20) years. This result is controversy with Kaur study [18]. This finding may be attributed to management of dental caries was increasing by age and directed toward either missed or filled teeth. Saliva was used as diagnostic aids because salivary constituents exhibit a well-documented role in health and disease, its emerging as a viable alternative to blood sampling [19]. Decision was made to collect stimulated saliva to obtain more saliva and it was reported that the stimulated saliva samples were superior because lower sample variance than with un-stimulated saliva [20].

Findings showed non- significant differences in copper level in saliva between the age groups which similar to other studies [21, 22, 23].

Regarding salivary Zn level results also reported non-significant differences in this element among different age groups which could be attributed to small range of age group in present study, which is in agreement with Borella et al study [21] who reported that Zn level is not affected by age, while is inconsistent with Hussein et al study [22] which revealed significant differences in Zn level among different age groups (8-12) years without any explanation and this point of controversy need further investigation. The current study showed a positive correlation between salivary Zinc level and DMFS and DS. These findings differ with that of a study in young adults [21] and other studies in children [10, 23] who reported a negative correlation between Zn level and dental caries which may be attributed to high level of zinc leads to greater mineralization and accumulation of zinc quantities on surface enamel that becomes more caries resistance [24] and similar with other studies [22, 25]. This finding, in current study, might be attributed to that the properties and behavior of Zn element in saliva that are similar to those of Cu, which could dissolve from the tooth into saliva upon

demineralization that occurs with caries. A positive correlation was also reported between salivary copper and DMFS and DS which is similar to findings reported from some studies [22, 25] and disagrees with other studies [11, 26] who reported an increase in Cu concentration with decrease caries severity. This current study suggested that possibility of tiny Cu amounts present in the tooth could dissolve into saliva by demineralization, thereby resulted in the increase of Cu level in mixed saliva.

Findings in current study indicate a positive correlation between caries and salivary Cu and Zn suggesting the possibility of their effect in the formation of tooth decay. The variation in finding of present study from previous studies could be attributed to the method of biochemical analysis, age of sample and method of saliva collection.

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الخلاصة

الملخص: تسوس الأسنان هو مرض اجتماعي معد ويعتبر الأكثر شيوعا في الإنسان. نظرا لتأثيره الكبير والانتشار الواسع، فهو يعتبر مشكلة صحية عامة كبرى على الصعيد العالمي. وكانت للعناصر اللعابية تأثيرات كثيرة على تجربة التسوس.

الهدف من الدراسة: وقد أجريت هذه الدراسة لتقييم تجربة تسوس الأسنان (DMFS) حسب العمر والجنس وعلاقتها بالعناصراللعابية الخارصين والنحاس بين مجموعة من البالغين الذين تتراوح أعمارهم بين (19-22) سنة.

المواد والطرق: بعد فحص ثمانين شخصا 19-22 عاما من كلا الجنسين قد تم قياس تجربة التسوس وفقا لمؤشر DMFS. تم جمع عينات اللعاب المحفز وتحليلها كيميائيا تحت ظروف موحدة للكشف عن العناصر اللعابية الزنك والنحاس. تم قياس تراكيز الزنك والنحاس باستخدام القياس الطيفي للامتصاص الذري.

النتائج: قيمة متوسط التسوس (DMFS وDS) لدى مجموع الذكور الاجمالي أعلى من قيمة متوسط التسوس لدى مجموع الإناث الاجمالي مع عدم وجود فرق احصائي معنوي فيما يتعلق بالتسوس(DMFS) في حين وجد فرق احصائي معنوي فيما يتعلق بالتسوس (DS). كان لدى الفئة العمرية (19-20) الاولى متوسط التسوس أقل من الفئة العمرية الثانية (21-22)، في حين أنه كان لديها متوسط التسوس (DS) اعلى من الفئة العمرية الثانية (21-22) مع عدم وجود فرق احصائي معنوي.

وكانت مستويات العناصر االلعابية (الزنك والنحاس) أعلى بين المجموعة النشطة التسوس من المجموعة الخالية من التسوس ولايوجد فرق معنوي في مؤشر التسوس بين المجموعات. كان لدى مجموع الذكور الكلي تقريبا نفس قيمة متوسط تراكيز الخارصين والنحاس اللعابية كما في مجموع الاناث مع وجود اختلافات احصائية غير هامة.هناك ارتباط ضعيف ايجابي غير كبير بين مؤشر التسوس DMFS والعناصر اللعابية الخارصين والنحاس.

الاستنتاج: اللعاب هو أحد العوامل الهامة في الوقاية من تسوس الأسنان. لذلك فان التغيرات الكيميائية في تكوين اللعاب تلعب دورا هاما في تطور وتقدم التسوس.

كلمات مفاتحية: تسوس الأسنان ,الزنك ,النحاس ,الشباب البالغين.